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THAILAND-EC COOPERATION FACILITY PHASE II (TEC II)

Smart/Intelligent Grid Development and Deployment in Thailand (Smart Thai)

Smart Thai Project: Key Results of the Programme

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Chairman, WADE THAI

21st June 2013
Pullman Bangkok King Power, Thailand

Materials will be available on WADE THAI website: http://wadethai.org/

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WORLD ALLIANCE FOR THAI DECENTRALIZED ENERGY

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FULL ADVANTAGE
Sustainable Energy and Environment Solutions

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Partners

Implementing Partner	Partner	Associate Partner
World Alliance for Thai Decentralised Energy (WADE THAI)	World Alliance for Decentralised Energy (WADE)	Full Advantage Co., Ltd. (FA)

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Total duration of the action

- Duration: 30 Months (Jan 2011 – June 2013)
- Total Budget: EUR 255,000
- EU Contribution: 72%

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General Objectives

- Improvement of the sustainable economic and social development of Thailand through the efficient delivery of sustainable, economic and secure electricity using Smart/Intelligent Grid systems based on EU models and technologies

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Specific Objectives

- Transformation of the generation, transmission and distribution network of Thailand through the enhancement of the capacity of Thai private and public sector organisations in introducing and promoting Smart/Intelligent Grid systems thereby contributing to the national development goals of Thailand in the area of environment, climate change and energy security

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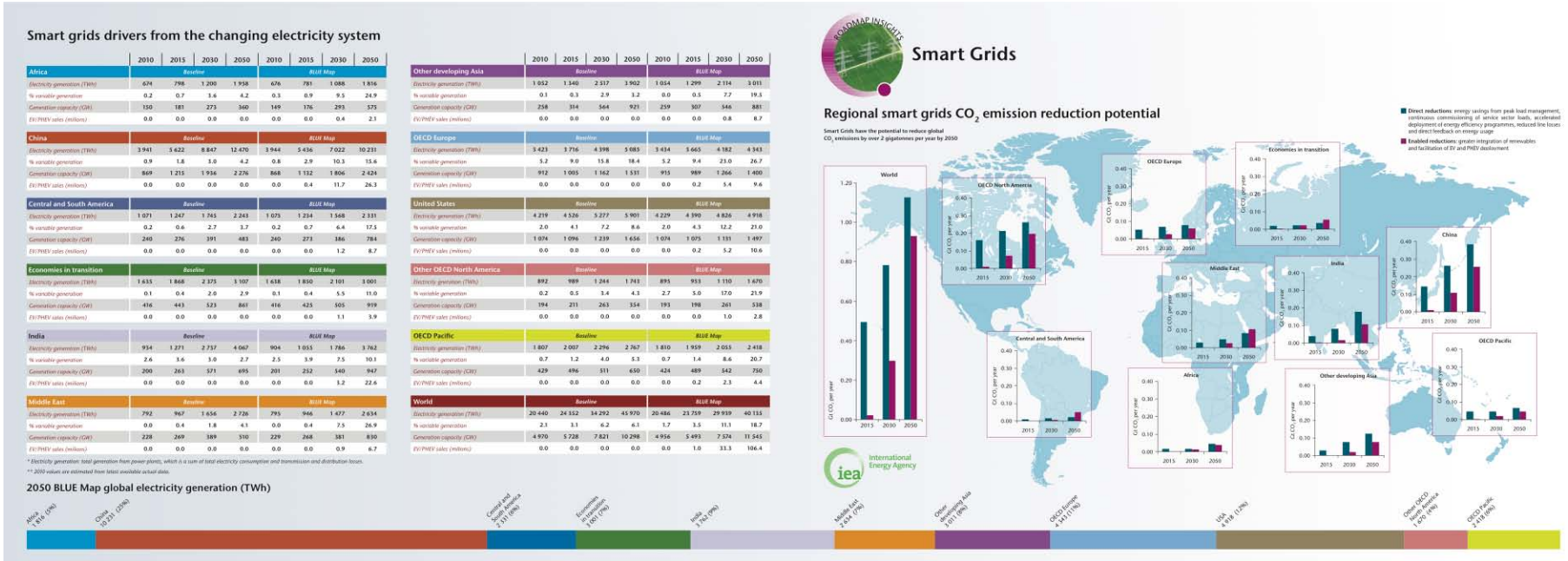
Component 1: Mainstreaming Smart/Intelligent Grid systems in the generation, transmission and distribution activities in Thailand

- Result 1.1: Supporting policies and regulatory frameworks for the adoption of Smart/Intelligent Grid systems strengthened
  - Brief report on existing policies in Thailand
  - Brief report on EU policies and experiences (France, Germany, Netherland, UK)
  - Analysis of barriers and policy recommendations



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Component 1: Mainstreaming Smart/Intelligent Grid systems in the generation, transmission and distribution activities in Thailand (cont.)

- Result 1.2: Understanding of relevant government agencies on the application of Smart/Intelligent Grid systems enhanced through dialogues with EU counterparts
  - List of relevant Thai and EU agencies and their representatives
  - Trip to EU (Germany, Belgium, France) and dialogues completed with participants from EGAT, PEA, MEA, EPPO, ERC, and Senate


EnBW Energie Baden-Württemberg AG
Brief portrait: Who we are

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Component 2: Capacity building, knowledge management and institutional development

- Result 2.1: Knowledge platform for the promotion and implementation of Smart/Intelligent Grid systems established and operational
  - Smart Thai Project micro-Website (linked from WADE THAI website)
  - Knowledge platform / Management Information System
  - Materials and reports developed under Smart Thai projects are publicly available on Smart Thai website

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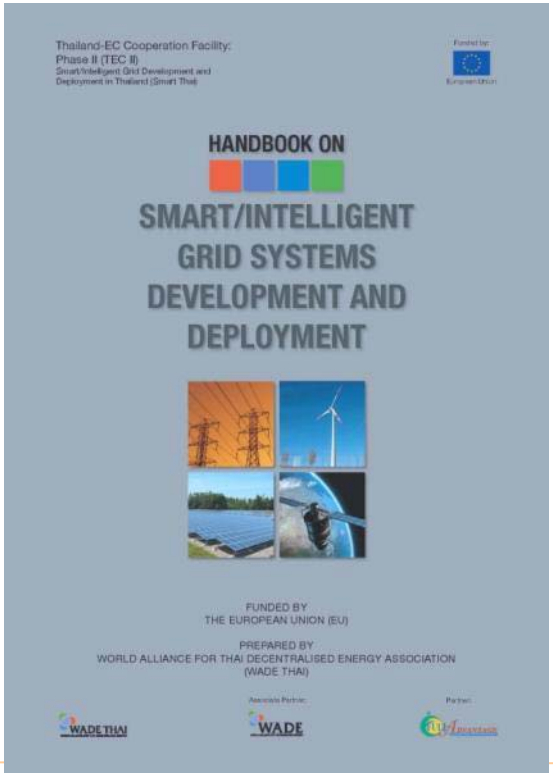
Component 2: Capacity building, knowledge management and institutional development (cont.)

- Result 2.2: Handbook on Smart/Intelligent Grid systems development and deployment, including EU best practices, completed and disseminated
  - Handbook on Smart/Intelligent Grid Systems Development and Deployment



Part I: Introduction to Smart Grid
Part II: Smart Grid Technologies
Part III: Smart Grid Barriers, Strategies and Opportunities
Part IV: Case Studies on EU Best Practices

- Handbook will be available in hard copy and CD-ROM to all relevant stakeholders i.e. EGAT, PEA, MEA, EPPO, DEDE, ERC.
- Handbook in soft copy will be publicly available on WADE THAI website: http://wadethai.org/

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Component 2: Capacity building, knowledge management and institutional development (cont.)

- Result 2.3: Capacities of relevant public and private organisations on Smart/Intelligent Grid systems developed through workshops, training, corporate exchanges, and public-private partnerships
  - A series of five (5) training-workshops:
    - Smart Grid: Experiences and Benefits
    - Energy Storage and Transmission Technologies for Smart Grid
    - Smart Grid: Metering and Communication
    - Smart Grid: Policy, Services and Applications
    - Pilot Project Simulation Model and Implications
  - Two (2) corporate exchanges
    - Network Operation & Management;
    - Electric Vehicle (EV) and Charging Stations;
    - Advance Metering Infrastructure (AMI);
    - Information and Communication Technology (ICT)
    - Vision to Smart Grid Deployment to 2050; Smart Grid in EU
    - Smart Grid: Role of Regulators and Regulatory Frameworks


Smart/Intelligent Grid Development and Deployment
Thailand (Smart Thai)
"Smart Grid : Policy, Services and Applications"
5th October 2012
WADE


Smart / Intelligent Grid Development and Deployment
in Thailand (Smart Thai)
Experiences and Benefits
29th September 2011
Pattaya City, Thailand
WADE
PEA

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Component 3: Supporting the introduction of pilot Smart/Intelligent Grid systems

- Result 3.1: Technical and economic feasibility of implementing Smart/Intelligent Grid systems on a pilot basis, including CDM potential, established
  - Feasibility study investigated the range of potential technical solutions and assessed the economics of implementing the Smart Grid system in the selected pilot area of Pattaya City (using the results of the computer simulation model (Result 3.2))
  - Brief report on GHG mitigation (using the results of the computer simulation model (Result 3.2))

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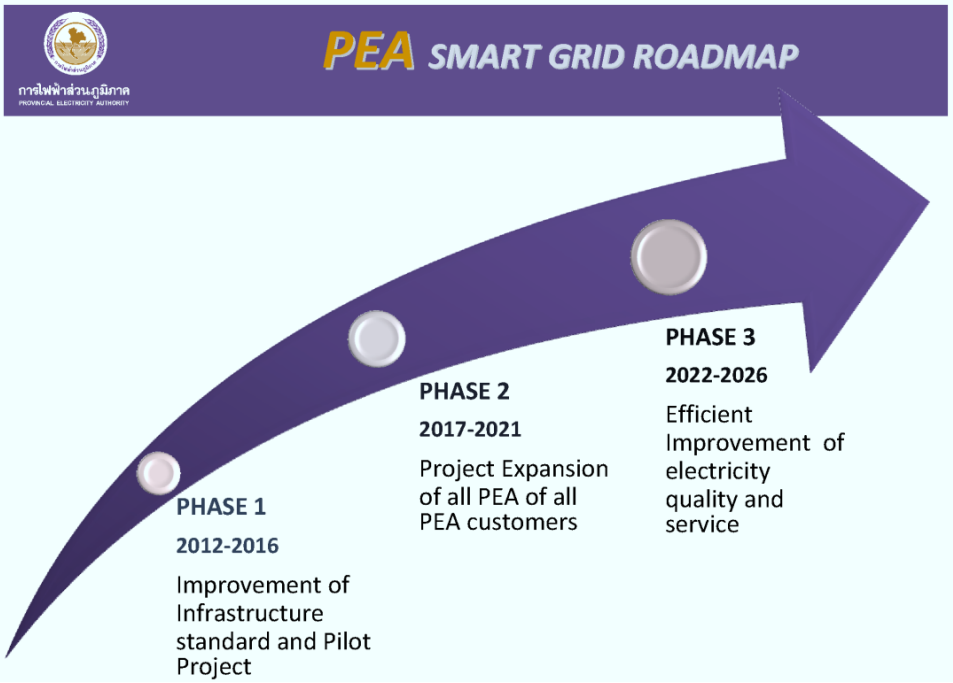

Pattaya City
Smart Grid Development Project

Key activities:

- Installation of Advanced Metering Infrastructure (AMI) – 118,636 units of single-phase and three-phase meters
- IEC61850 Substation Development
- Feeder Remote Terminal Unit (FRTU) Installation
- Mobile Workforce Establishment
- Rooftop Photovoltaic (PV) Installation
- Energy Storage Installation
- Charging Station Installation
- Home Automation

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Smart Thai Feasibility Study: Selected pilot area

- Desk research has been conducted to identify potential candidate areas for the selection of the pilot case for the simulation modelling and feasibility study.
- PEA Smart Grid Roadmap has chosen Pattaya city in Chonburi province as one of the first pilot areas for their AMI/Smart Grid project.
- The project has decided to be consistent with PEA's plan and has selected Pattaya city to use as the pilot area within this project, to eventually provide beneficial inputs to the first AMI/Smart Grid pilot project.

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Smart Thai Feasibility Study: Key contents

- Technical Overview and Analysis
- Financial Analysis
- Environmental Analysis: GHG Mitigation
- Risk Assessment
- Recommendations

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Technical Overview and Analysis: Key contents

- In order to limit the scope of Smart Grid technology, the technical review is based on the PEA proposed pilot project in Pattaya City.
- The review investigates the range of potential technical solutions, benefits, and challenges.
- Components of the FS include:
  - Smart Meters (Approx. 100,000)
  - Distribution Feeder Automation (Feeder Remote Terminal Unit)
  - Other supporting infrastructure
  - IEC 61850 Standard Implementation

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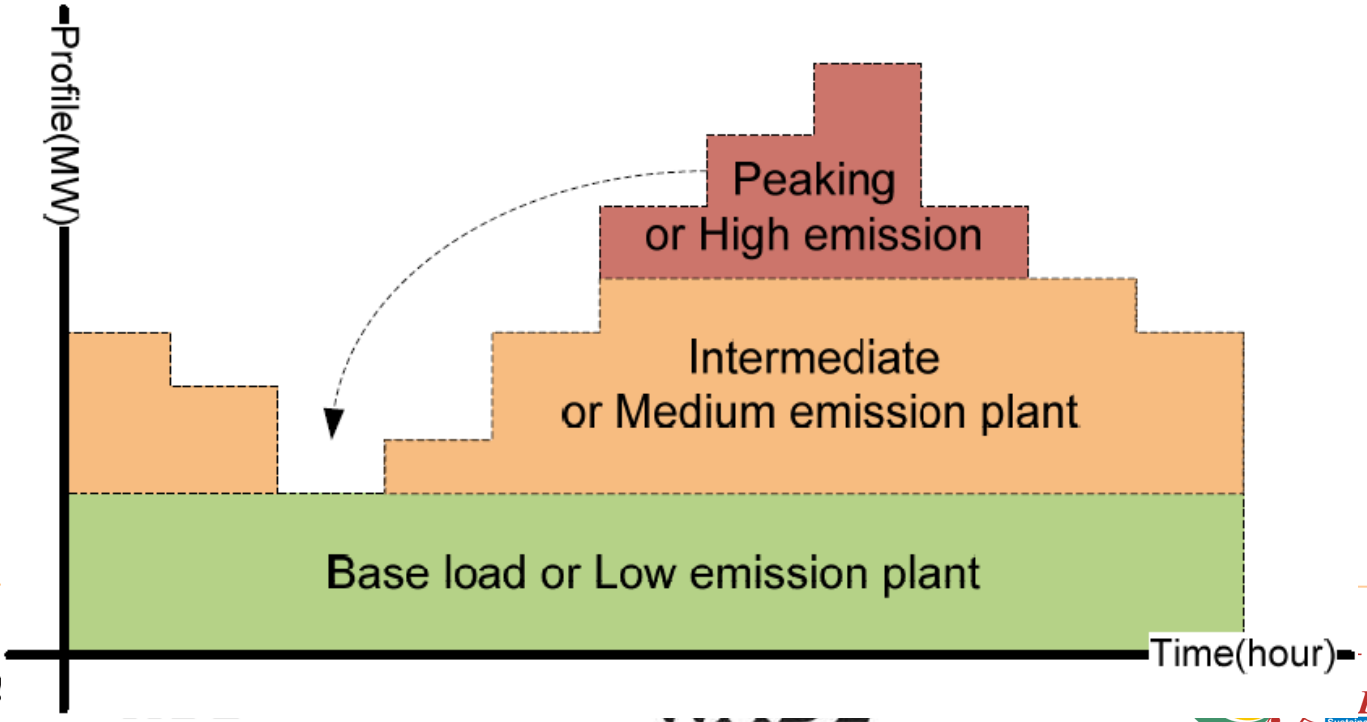
Environmental Analysis: GHG Mitigation

Demand load curve:

- The peak could potentially be decreased due to the application of the smart systems
- These peak operating plants, such as diesel engine power plant or diesel gas turbines, normally have higher emissions.
- By shifting the peak demand to the valley period, the intermediate plant, which normally runs in less polluting fuel, is carrying those shifted load.
- The amount of emission is then reduced



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Financial Analysis: Concept

- The financial model was integrated into the simulation model to determine the financial profitability of the proposed pilot project.
- The financial analysis examines the investments made against the operating revenues and costs generated by the project.
- The financial model was developed to detail the annual financial performance over its entire project life.
- Revenues from the smart systems would come from two sources:
  - savings in investment such as capacity investment, transmission and distribution
  - savings on operations and maintenance and fuel consumption such as generation O&M costs, generation fuel costs, and feeder O&M costs
- Based on assumed consumer uptake and behavioral shift, financial results indicate that the project could be a viable economic proposition.

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Risk Assessment

- Future Proofing
  - Smart Grid is a new technology, which is still evolving and is expected to continue to evolve for some time
  - Questions are raised on the proper timing and right technology.
    - What happens as the technologies mature? Will something better come along down the road? Will these technologies become stranded costs? Are there smart grid solutions that have not been identified yet?

- Need for New Smart Grid Personnel and Capacity Building for the Existing Personnel
  - Injecting new talented Smart Grid specialists and building capacity of existing personnel will be challenging and should be given high priority.

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Other Risk Assessment

- Consumer Participation
- Generation and Storage Options
- Products, Services and Markets
- Power Quality
- Asset and Efficiency Optimisation
- Response to System Disturbances
- Resiliency to Cyber-attack, Terrorist Attack and Natural Disasters

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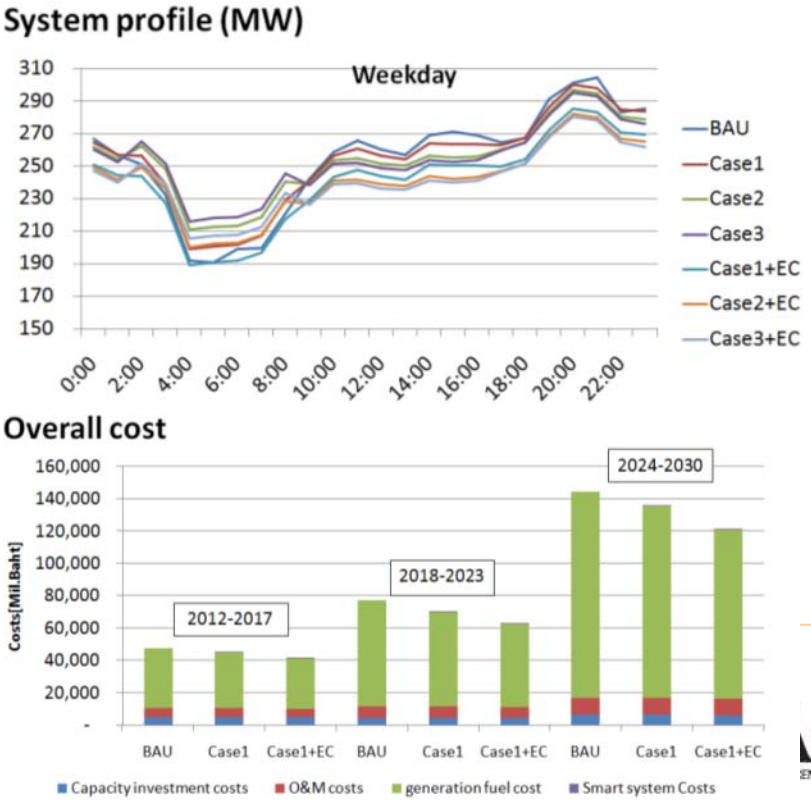
Component 3: Supporting the introduction of pilot Smart/Intelligent Grid systems (cont.)

- Result 3.2: Simulation system to demonstrate the technical and economic merits of the pilot Smart/Intelligent Grid system developed and tested
  - Simulation Model completed and demonstrated during the hands-on training-workshop. This allows the participants to change the inputs and test the operations of the simulation model.



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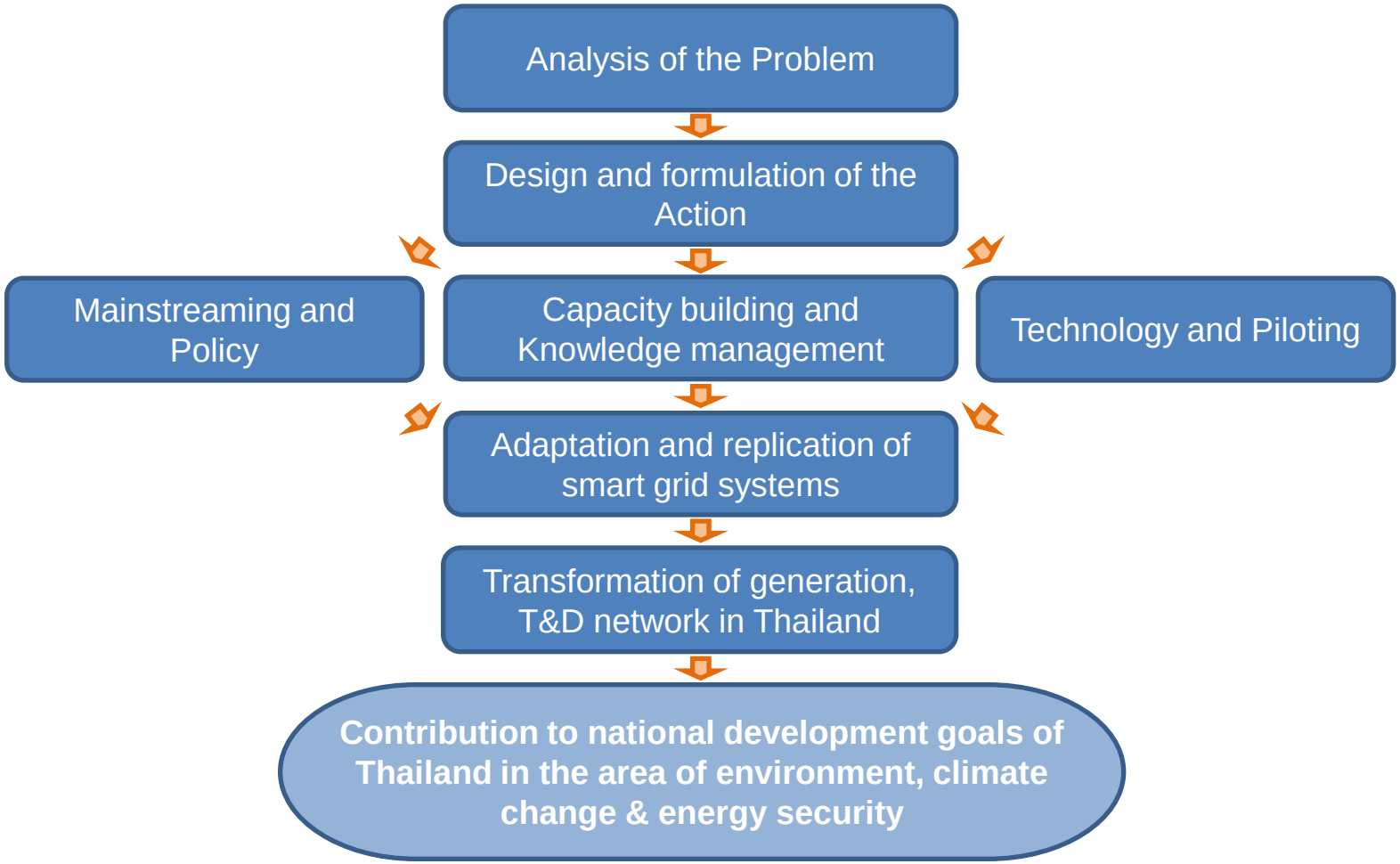
Conceptual Framework



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Main Actors/Stakeholders

Actor/Stakeholder	Role(s)
1. Small-to-medium-sized industries who are users of energy in Thailand	-Participation in capacity building activities -Potential host of pilot smart grid system
2. Small-to-medium-sized industries supplying energy equipment in Thailand	-Provision of information on components for feasibility study and computer simulation -Participation in capacity building activities
3. Utilities and technology suppliers in EU	-Hosting of EU dialogues -Provision of experts in corporate exchanges -Provision of information on components for feasibility study and computer simulation
4. Private generating companies in Thailand, such as: IPPs; SPPs; VSPPs	-Participation in capacity building activities -Identification of potential areas for piloting of smart grid systems
5. Utilities on generation, transmission and distribution in Thailand, namely: EGAT; PEA; MEA	-Participation in dialogues with EU counterparts and other capacity building activities -Hosting of corporate exchanges from EU companies -Provision of information on components for feasibility study and computer simulation
6. Relevant Government agencies in the energy sector, namely: MoE; DEDE; EPPO; ERC	-Provision of information on components for feasibility study and computer simulation -Participation in training-workshops -Regular use of computer simulation for planning and decision-making related to future energy capacity additions in the country and investments in transmission and distribution networks

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THANK YOU

Smart Thai Project Materials are available on website:
http://wadethai.org/smartthai/